

KARTA PRZEDMIOTU – WZÓR

Wydział Budownictwa i Inżynierii Środowiska										
Field of study full-time	Biotechnology							Level and form field of study	first degree full-time	
Specialty / diploma path	Common subject							Education profile	General academic	
Course name	Course name							Course code	BT1S310020	
								Type of subject	obligatory	
Forms of classes and number of hours	W	Ć	L	P	Ps	T	S	Semester	III	
	15				15			ECTS credits	3	
Introductory subjects	Fundamentals of biotechnology, Biochemistry, Microbiology									
Objectives of the subjects	The student learns about the influence of hydrodynamic conditions on living cells, with bioreactor engineering - methods of balancing biochemical processes, kinetics of changes in bioreactors, transport processes (heat and mass exchange) taking place in bioreactors..									
Program content	Lecture: Kinetics of changes in bioreactors, transport process (heat and mass exchange) in bioreactors. Presentation of separation and purification processes of biotechnological products. Technical methods of separation of suspensions and disintegration of cells, extraction, distillation with rectification, precipitation and crystallization, sorption, membrane and chromatographic techniques, drying of biological materials. Apparatus and devices used in biochemical technologies and the principle of organization of biotechnological production and quality assurance. Typical technologies used for the production of bioproducts - microbial biomass, alcohols, organic acids, amino acids, enzymes, pharmaceuticals. Environmental protection biotechnologies - sewage and gas treatment, solid waste processing, soil bioremediation. Specialist laboratory: Production of ethanol, polysaccharides, production of organic acids, antibiotics, vitamins, steroids, raw materials and vaccines, production of biomass, biotechnologies in selected branches of the food industry, production of industrial enzyme preparations, biohydrometallurgy, isolation and purification of products, economics of biochemical technologies.									
didactic methods	Wykład informacyjny, ćwiczenia przedmiotowe									

form of crediting the course	Lecture - written test, final grade on a point scale (20-19) - 5.0; (18-17) - 4.5; (16-15) - 4.0; (14 - 13) - 3.5; (12) - 3.0 pecialist workshop: Implementation of a multimedia presentation, the components of which are assessed on a point scale. The elements of the presentation include: 1. Compliance of the subject of the presentation with its content (0-1 points) 2. Substantive value of the presented content (0-5 points) 3. Aesthetics of the presentation (0-2 points) 4. Discussion on the presented content (0-2 points) Puzzle (0-4 points) Final grade percentage thresholds (% points): 95-100% - 5.0 ≥ 90 <95% - 4.5 ≥ 80 <90% - 4.0 ≥ 70 <80% - 3.5 ≥ 60 <70% - 3.0	
Symbol efektu uczenia się	Zakładane efekty uczenia się	Odniesienie do kierunkowych efektów uczenia się
EU1	Knows at an advanced level selected facts about microorganisms and preparations of industrial and technological importance and the methods of their use for the implementation of biotechnological processes	BT1_W04,
EU2	Knows the possibilities of using bioreactors and biotechnological techniques with the use of living organisms in biotechnology, and can develop documentation for the implementation of an engineering task and prepare a text containing an overview of the results of this task.	BT1_W06, BT1_U02
EU3	Knows the possibilities of using bioreactors and biotechnological techniques with the use of living organisms in biotechnology; can obtain information from literature, databases and other sources; is able to integrate obtained information, interpret it, as well as draw conclusions and formulate and justify opinions	BT1_W06, BT1_U01
EU4	Knows in depth the issues related to the life cycle of products, devices and installations used in industrial and food biotechnology, can, in accordance with a given specification, design a simple system or process, typical for biotechnology, prepare and present a short presentation on the results of an engineering task carried out in the field of in biotechnology, participate in discussions, present and evaluate different opinions	BT1_W08, BT1_U10 BT1_U12
EU5	Can work individually and in a team; knows how to estimate the time needed to complete the task; is able to	BT1_U12, BT1_U14, BT1_K04

	develop and implement entrepreneurial thinking, responsible activities for the public interest work schedule ensuring meeting deadlines prepare and present a short presentation on the results of an engineering task implemented in the field of biotechnology, participate in discussions, present and evaluate various opinions	
EU6	is ready to analyze the received content and critically evaluate it	BT1_K01
Symbol of the learning effect.	Means of verification of learning outcomes	The form of classes in which the verification takes place
EU1	Half credit, presentation, project	W, Ps
EU2	colloquium	Ps
EU3	Half credit, presentation, project	W, Ps
EU4	presentation, project	Ps
EU5	Half credit, presentation, project	W, Ps
EU6	Half credit, presentation, project	W, Ps
Balance of student workload (in hours)		Number of hours
Calculation	participation in lectures	15
	participation in exercises	15
	working at home on problems from a specialist laboratory, preparation for colloquium	20
	preparation and attendance at the lecture (8h + 2h credit) 20	20
	participation in consultations	5
	RAZEM:	75
Quantitative indicators		HOURS ECTS
Student workload related to the activities requiring the direct participation of the teacher		30 1
Student workload related to practical classes		45 2
Basic literature	<i>K.W. Szewczyk: „Technologia biochemiczna”, OW Politechniki Warszawskiej, Warszawa 2003C 2.</i> <i>J.Zamorska. D.Papciak: „Wybrane zagadnienia biotechnologii środowiskowej”, OW Politechniki Rzeszowskiej, Rzeszów 2001C.</i> <i>Ratledge, B.Kristiansen: „Podstawy biotechnologii”, Wydawnictwo Naukowe PWN, Warszawa 2011.</i>	
Supplementary literature	A. Zgirski, R. Gondko, <i>Obliczenia biochemiczne</i> , PWN 1983	
Executing unit	Katedra Technologii i Systemów Inżynierii Środowiska	Program development date
The program has been developed by)	dr hab. Janina Piekutin prof. PB	10.02.2019

